Indentifying suitable Areas to Plant Baldcypress Trees Using NASA Earth Observations to Enhance the Restoration Efforts in St. Bernard Parish, Louisiana

by

NASA DEVELOP

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Maria Arguelles

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EXT. near Pearl River. DAY - Outdoor Scene near the Pearl River in Mississippi.

Shot - MEDIUM: pictures will fly on the screen while Michael is talking.

Michael Ewing

St. Bernard Parish in Louisiana has been struck by a series of unfortunate events dating back to the industrial revolution when the area experienced an influx of logging, then again in 1956 with the construction of the MRGO, and most recently Hurricane Katrina.

Ecosystems have been destroyed due to subsidence, salt water intrusion, nutrient loss, low sedimentation, herbivory, invasive species, canal dredging, levee construction, impoundment, and oil and gas exploration.

Because of ecosystem loss in the area, vegetation needs to be restored to provide the parish with a protective barrier from storms.

The baldcypress swamp forests act as an essential component of the Multiple Lines of Defense strategy used by the LACPR Plan, which relies on the natural environment and manmade features.

We, as NASA DEVELOP interns, hope the end products will aid restoration efforts in St. Bernard Parish.

This project demonstrates the usefulness of NASA EOS in rebuilding and monitoring coastal ecosystems.

SHOT – MEDIUM: questions being asked will show at the middle of the screen

Questions:

As a resident of the coast, how has the loss of coastal environments affected you?

INT. Rebecca Livaudais’residence. DAY - Interview of Rebecca Livaudais.

Rebecca Livaudais, St. Bernard Wetlands Foundation

Land that we used to be able to plant on and have estuaries is now, some of it, open water.

INT. Meraux Foundation House. DAY – Interview of Chris Haines and Bill Haines.

Chris Haines, Meraux Foundation

The water gets closer every day. It’s just a choice to live here.

Bill Haines, Meraux Foundation

We know the ecosystems changed, we know the saltwater intrusion has caused plant life to die in areas that used to be lush.

EXT. Anthony Fernandez’s property. DAY - Interview of Tony Fernandez and Blaise Pezold. The question being asked will flash across the screen.

Anthony Fernandez, St. Bernard Land Owner

We’re also in far greater jeopardy of flooding and violent winds from storms.

Question:

What are you doing to aid restoration efforts?

INT. Rebecca Livaudais’ residence. DAY - Interview of Rebecca Livaudais.

Rebecca Livaudais, St. Bernard Wetlands Foundation

St. Bernard Wetlands Foundation is a nonprofit organization; it owns the nursery that's on my property. We are trying to plant and reforest the area.

INT. Meraux Foundation House. DAY – Interview of Chris Haines and Bill Haines.

Chris Haines, Meraux Foundation

We're potting up trees similar to what the St. Bernard Wetlands Foundation does. Trying to get them to a decent enough size to put them out and have a higher survivability rate. We also work with different groups that do educational outreach. So the more that we can help spread the word, I think the more the buy in we can get.

EXT. Anthony Fernandez's property. DAY - Interview of Tony Fernandez and Blaise Pezold. The question being asked will flash across the screen.

Anthony Fernandez, St. Bernard Land Owner

I'm certain that we have planted probably approximately half a million trees.

Blaise Pezold, Wetlands Tree Foundation

We planted about 900 trees last year, we gave away 220 to people in Terrebonne Parish, and we gave 80 more trees to the Pointe Au Chien Indian Tribe.

Question:

What would you suggest be done to improve restoration efforts?

INT. Rebecca Livaudais' residence. DAY - Interview of Rebecca Livaudais.

Rebecca Livaudais, St. Bernard Wetlands Foundation

Well certainly I think everyone needs to spread the word that Louisiana's wetlands are really America's wetlands.

EXT. Anthony Fernandez's property. DAY - Interview of Tony Fernandez and Blaise Pezold. The question being asked will flash across the screen.

Anthony Fernandez, St. Bernard Land Owner

I think that all of our efforts could be coordinated a little bit better.

Blaise Pezold, Wetlands Tree Foundation

My biggest criticism of restoration efforts is that they are based on economic issues and economics are thought of first.

INT. Meraux Foundation House. DAY – Interview of Chris Haines and Bill Haines.

Bill Haines, Meraux Foundation

I think we need to get a national buy in, myself. I think people need to realize all that's at stake with the loss of the land in this delta region. It affects the entire country.

EXT. near Pearl River. DAY - Outdoor Scene near the Pearl River in Mississippi.

All team members tell their classification and what school they attend.

Emma Strong

My name is Emma Strong and I am a graduate student at The University of Southern Mississippi.

Michael Ewing

My name is Michael Ewing and I am a graduate student at The University of Southern Mississippi.

Chelsey Kelly

My name is Chelsey Kelly and I am an undergraduate student at The University of Southern Mississippi.

Maria Arguelles

My name is Maria Arguelles and I am an undergraduate student at The University of Miami.

Ross Reahard

My name is Ross Reahard and I am a graduate student at The University of New Orleans.

INT. Building 1105. DAY – Voiceovers and pictures will come into the screen and be elaborated on.

Chelsey Kelly

The three step methodology of this project includes accurate and updated elevation, land cover, and infrastructure data. Elevation is a major factor in determining where a particular species of vegetation can survive in coastal Louisiana. Land cover is important because Baldcypress seedlings cannot be planted in shady mature forests. Transportation infrastructure and freshwater are important and essential factors for finding adequate planting sites for baldcypress.

Maria Arguelles

We collected data from Terra and Landsat satellites as well as the AVIRIS sensor. Various GIS data files from sources such as the US Census, USGS, and The Louisiana Atlas server were compiled. In addition, we created our own shape files of pumping station, levees, and the land water boundaries in the parish.

Michael Ewing

We collected historical aerial images from the USGS server which we converted, cropped, georeferenced, and mosaicked using ERDAS IMAGINE and ArcMap. Rasters such as the 2006 NLCD, soil survey, and elevation were clipped to the parish

boundary. This enabled accurate assessment of St. Bernard Parish by allowing the project to focus on areas that require the most attention and to assist the NGOs to more efficiently meet their goals.

Chelsey Kelly

We created a shapefile of the St. Bernard levees, which provides the project with a better view of the parish features.

We edited and categorized the Tiger Roads shapefile to show accessibility of infrastructure to planting sites.

We also created a shape file of the pumping stations; these stations drive freshwater into areas that create environments ideal for baldcypress because seedlings need to be inundated.

The DEM was used to determine suitable planting elevations for baldcypress, as the plant best grows in elevations of 0.5 to 2 meters.

Michael Ewing

A soil suitability index was created for all trees that are native to the area, such as the baldcypress. The soil types were rated from well suited to not suited. DEMs were classified in .5 meter increments to show suitable elevations.

A 15m buffer was placed around the freshwater in the parish which indicates plausible planting sites.

Maria Arguelles

We found all areas that had an appropriate soil content, elevation, and open land for baldcypress. This information is vital because it determines the most suitable planting sites, which allow for the lowest mortality rates.

Further work can be done to produce elevation suitability maps for other tree species as well.

Credits

Anthony Fernandez, St. Bernard Land Owner

Blaise Pezold, Wetlands Tree Foundation

Rebecca Livaudais , St. Bernard Wetlands Foundation

Chris and Bill Haines, Meraux Foundation

Picture Credits:

Emma Strong

Michael Ewing

State of Louisiana Department of Wildlife and Fisheries

USGS

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NOAA

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